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PATENT SPECIFICATION



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COMPLETE SPECIFICATION

Improvements in Hermetic Closures for Bottles and like Containers for Corrosive Liquids

We, MALLINCKRODT CHEMICAL WORKS, a corporation duly organized under the laws of the State of Missouri, of 3600, North Second Street, St. Louis, State of Missouri, United States of America, do hereby declare the nature of this invention and in what manner the same is to be performed to be particularly described and ascertained in and by the following statement:—

This invention relates to closures for bottles and like containers.

Among the several objects of the invention may be noted the provision of a device which is entirely satisfactory for use as a closure for bottles containing corrosive liquids such as acids and the like; the provision of a bottle closure wherein a sealed glass-to-glass joint is at all times maintained but wherein excessive and expensive grinding operations in order to make the glass joint a perfect seal, are eliminated; the provision of a closure member which is readily and quickly applied to and removed from its bottle; the provision of a closure of the class described wherein there is no necessity of matching individual closures to individual bottles as is the case with glass stoppers; and the provision of a closure of the class described which is relatively simple and economical to manufacture and which is highly satisfactory in operation. Other objects will be in part obvious and in part pointed out hereinafter.

It is known to interpose packing discs of resilient material such as cork between a screw closure-cap and the top surface of a bottle, glass jar or like container. A screw cap closure for a fruit jar is also known comprising a screw cap having a rubber ring seated in a groove at its open end, the top or end of the fruit jar being covered with a porcelain disc and the cap screwed down thereon, the rubber ring engaging resiliently on the shoulder of the jar. It is also known to grind the mouth of a glass jar or bottle to provide a plane surface and to apply a closing plate of glass thereto, the plate being secured in position by a screw closure, by an elastic band or by a closure cap comprising a ring

and collar pressed by a spring on to the jar or bottle.

According to the present invention there is provided a closure for bottles and like containers having a flat annular ground region at the opened end of the receptacle and a flat disc adapted to be placed in engagement with the flat annular ground surface and having a cap with internal thread adapted for co-operation with a threaded part of the receptacle, including a yielding element interposed between the flat disc engaging the annular ground surface of the receptacle and the cap through which the flat disc is pressed against said flat ground surface.

In the accompanying drawings, in which is illustrated one of various possible embodiments of the invention,

Figure 1 is a side elevation of a bottle, showing a closure embodying the present invention;

Figure 2 is an enlarged axial section of the closure of Figure 1: and

Figures 3, 4 and 5 are horizontal cross sections taken substantially along lines 3—3, 4—4 and 5—5, respectively, of Fig. 2.

Similar reference characters indicate corresponding parts throughout the several views of the drawings.

Safety considerations make it necessary that certain corrosive liquids, such as strong acids, be shipped only in bottles which have corrosion-proof closures. The manufacture of ground glass stoppered bottles is a relatively expensive proposition. In order to obtain a reliable closure for corrosive liquids, each stopper has to be ground to fit into its own, individual bottle. Ground glass stoppers are not interchangeable in bottles of the same size, but, on the contrary, each stopper must be used with the bottle for which it was originally ground. The expense factors thus introduced by ground glass stoppers, and their individual grinding render the use of containers employing such closures relatively expensive. It is one of the primary purposes of the present invention to provide a bottle closure which has the same degree of corrosion proofness as the

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prior ground glass stoppers, but which closure is much simpler and more economical to manufacture than are ground glass stoppers.

Referring now more particularly to Fig. 1, numeral 1 indicates a bottle, which, of course, may be of any size or shape, and of suitable material such as glass or porcelain. The bottle 1 is provided with a neck 3, the end of which receives a closure indicated generally by numeral 5.

Referring more particularly to Fig. 2, the neck 3 includes a cylindrical portion 7, which is downwardly terminated by an outwardly extending flange 9. Molded on the surface of cylindrical portion 7 are a plurality of helical threads 11. Above the cylindrical portion 7, the neck 3 is provided with an annular trough or groove 13. An outwardly extending flange or pouring lip 15 upwardly terminates the neck 3.

The upper face 17 of this flange 15 is ground, as indicated in Fig. 4, until it is perfectly flat. Such grinding may be done in a very economical manner, for example, by rubbing the surface 17 against the surface of a flat sheet of plate glass on which has been placed a slurry or paste of carborundum flour. Such a flat-surface grinding is much simpler and more quickly carried out, for example, than the curved-surface grinding heretofore needed for ground glass stoppers in similar bottles.

Returning to Fig. 2 numeral 19 indicates a circular disc of suitable material such as plate glass or porcelain, resting on the ground surface 17. The disc 19 is preferably cut from a good grade of glass that is reliably flat on at least one side, for example, so that it will fit tightly against the surface 17 entirely thereover. Atop the disc 19 is a rubber or similar plastic material washer 21, the shape of which is shown at Fig. 5. It will be seen that the washer 21 is annular in shape, with a plurality of radial projections or ears 23 extending from its outer periphery. In the preferred embodiment of the invention, the washer 21 is made of gum rubber, for purposes to be described hereinafter.

Numeral 25 indicates a molded cap which is of a general cup-like shape, and which is provided, near the lower edge of its inner surface, with helical grooves 27 forming threads cooperating with the helical threads 11 on the bottle neck 3. For facility in screwing and unscrewing the cap 25, knurling marks or the like, indicated by numeral 29 in Fig. 1, are preferably provided on the outer surface of the cap. The cap 25 may be made of any suitable material, such as artificial resins

and the like. The cap need not be resistant to the particular corrosive liquid that is to be packaged.

In sealing the bottle, the elements are assembled over the filled bottle in the manner indicated in Fig. 2, with the glass disc 19 against the ground surface 17, and the rubber washer 21 between the upper surface of the glass disc 19 and the inner surface of the cap 25. The cap 25 is then screwed down tightly on the neck 3. This places the annular rubber washer 21 under compression and it tends to expand both radially inwardly and radially outwardly. There is nothing to obstruct its radial inward expansion, and the manner in which it is spaced from the inner walls of the cap 25 by the ears 23 provides that there is also room for radially outward expansion. It will be noted that the washer 21 is located on the glass disc 19 only over the regions of the glass disc that are in turn juxtaposed against the ground surface 17. This means that only the crushing strength of the glass in the disc 19 is used, instead of the flexing strength of the glass, in tightening the closure.

If the material of the washer 21 is the preferred gum rubber, then, in the course of two or three hours after the top 25 has been screwed down tightly, this gum rubber will have partially welded or vulcanized itself both to the cap 25 and to the glass disc 19. Thereafter, when the cap 25 is removed from the bottle, it carries with it the washer 21 and glass disc 19, as if these elements were permanently mounted in the cap.

The seal that is obtained between the glass disc 19 and the ground surface 17 is usually a perfect seal without any further precautions. However, where gas pressures are involved, an inert and impervious lute such as petroleum jelly is used between the ground surface and the disc. It is usually advisable prior to closing the bottle for the first time, to spread a thin film of white petroleum jelly or like material on the ground glass surface 17, as this appears to assist in obtaining a true seal between the plate 19 and the surface 17.

Because of the compression of the washer 21 the cap 25 can usually be turned as much as a full additional quarter-turn in the direction of sealing the bottle, after the first instant that the bottle is sealed. In other words, if the cap 25 is screwed down as tightly as it will go, it can be retracted a full quarter-turn before the sealed condition of the bottle is impaired. This is of great commercial importance, because it means that the cap will not loosen to a point permitting leakage of the liquid in the bottle,

under normal handling conditions, even though the cap does loosen somewhat on the bottle.

In order generally to protect the molded cap 25 against the corrosive influence of the liquid in the bottle, provided said cap 25 is made of a material that is not already corrosion resistant, we have found it advantageous to dip the cap 25 momentarily into molten paraffin, or some similar material, so that it will have a thin surface coating of paraffin to make it corrosion proof.

In the finished bottle, the notch 13 is for the purpose of providing a pouring lip. This notch 13 is not specifically claimed in the present application.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. A closure for bottles and like containers having a flat annular ground region at the opened end of the bottle or container and a flat disc adapted to be placed in engagement with the flat annular ground surface and having a cap with internal thread adapted for co-operation with a threaded part of the bottle or container, including a yielding element interposed between the flat disc engaging the annular ground surface of the bottle or container and the cap through which the flat disc is pressed against said flat ground surface.

2. A closure for bottles and like containers, as set forth in Claim 1, in which the yielding disc interposed between the pressure device and the first mentioned flat disc engages said first mentioned flat disc in opposition to that zone only at which said flat disc engages the flat annular ground end face of the receptacle.

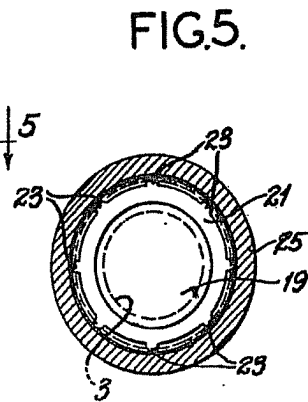
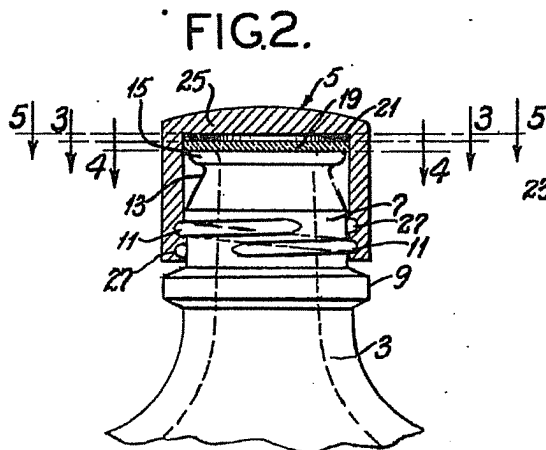
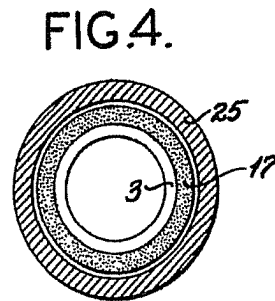
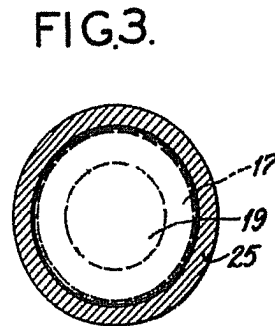
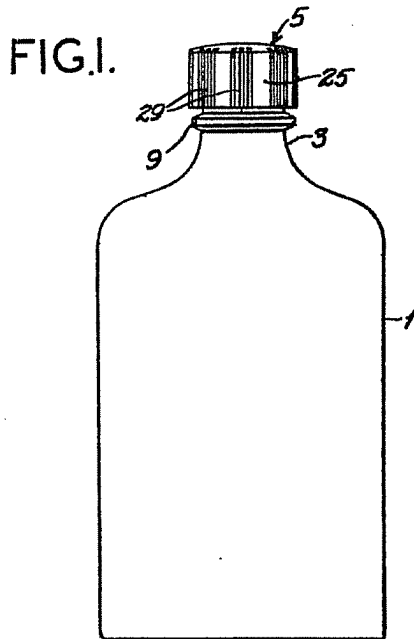
3. A closure as set forth in either of Claims 1 or 2, including as material for the yielding disc interposed between the pressure device and the first mentioned flat disc, a material adapted to be firmly and permanently joined by pressure after relatively short time to the pressure device and to the first named flat disc, whereby upon releasing the closure and restoration of the same, the assembly of elements comprising the pressure device, the flat disc and the interposed yielding disc are attachable together or removable together with respect to the container.

4. A closure as set forth in Claim 1, in which the flat disc engaging the flat annular ground surface at the end of the container is a disc of glass, the area of which in engagement with the annular ground end face of the container is not ground.

5. A closure for bottles and like containers, substantially as described and shown, and for the purpose set forth.

Dated this 24th day of May, 1938.

For the Applicants,
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[This Drawing is a reproduction of the Original on a reduced scale.]